

CLAIMS

1. Method for operating a frequency converter (26,26',26") of a generator (14,14',14") in particular of a wind energy turbine (10,10',10"), in the event of a substantial grid voltage drop, wherein the frequency converter (26,26',26") comprises a generator-side power converter (32,32',32"), to be connected to the generator (14,14',14"), a grid-side power converter (28,28',28") to be connected to the voltage grid (18,18',18"), and a DC link circuit (30,30',30") for connecting the generator-side power converter (32,32',32") to the grid-side power converter (28,28',28"), the method comprising the step of
 - generating the amount of reactive current to be supplied to the grid (18,18',18") by controlling the frequency converter (26,26',26") so as to generate reactive current.
2. Method according to claim 1, wherein the generator (14) is a double fed asynchronous machine and wherein generating the amount of reactive current to be supplied to the grid (18) is performed by controlling at least one of the generator-side power converter (32) and the grid-side power converter (28).
3. Method according to claim 2, wherein, if the generator (14) is not in its operating state for generating power, the reactive current to be supplied to the grid (18) is generated by controlling the grid-side power converter (28).
4. Method according to claim 1, wherein the generator (14,14") is an asynchronous machine and wherein generating the amount of reactive current to be supplied to the grid (18,18',18") is performed by controlling the grid-side power converter (28,28',28").
5. Method according to claim 1, wherein the generator (14',14") is a synchronous machine and wherein generating the amount of reactive

current to be supplied to the grid (18',18") is performed by controlling the grid-side power converter (28',28").

6. Method according to claim 4 or 5, wherein, if the generator (14',14") is not in its operating state for generating power, the reactive current to be supplied to the grid (18',18") is generated by controlling the grid-side power converter (28',28").
7. Method according to any one of claims 1 to 6, wherein for generating reactive current through the frequency converter (26,26',26") the performance factor is controlled.
8. Method according to any one of claims 1 to 7, wherein the reactive current controlling step or at least one of the reactive current controlling steps is performed when, for period of time of a few milliseconds up to a few seconds, the grid voltage is decreased up to at least about 40 %, preferably 20 % and, in particular, 15 % of its normal value.
9. Method according to any one of claims 1 to 8, wherein the reactive current controlling step or at least one of the reactive current controlling steps is terminated when, after a grid voltage drop, for a few seconds the grid voltage is increased again up to at least about 70 %, preferably 80 % and, in particular, 90 % of its normal value.
10. Method for operating a frequency converter (26,26',26") of a generator (14,14',14") in particular of a wind energy turbine (10,10',10") under substantially normal grid condition and with the generator (14,14',14") not being in its operating state, wherein the frequency converter (26,26',26") comprises a generator-side power converter (32,32',32"), to be connected to the generator (14,14',14"), a grid-side power converter (28,28',28") to be connected to the voltage grid (18,18',18"), and a DC link circuit (30,30',30") for connecting the generator-side power

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converter (32,32',32") to the grid-side power converter (28,28'28"), the method comprising the step of

- controlling the amount of reactive current to be supplied to the grid (18,18',18") by controlling the grid-side power converter (28,28',28").

11. Method according to claim 10, wherein the generator (14,14',14") is a asynchronous machine, a double fed asynchronous machine, or a synchronous machine.
12. Method according to claim 10 or 11, wherein for controlling reactive current through the frequency converter (26,26',26"), the performance factor of the grid-side power converter (28,28',28") is controlled.
13. Method according to any one of claims 1 to 12, wherein the control of the frequency converter (26,26',26") is supervised by the utility (44,44',44") or a power management control (40,40',40",42,42',42") of the generator (14,14',14") or of a group of generators (14,14',14") at least one of which is operatively connected to the grid (18,18',18").
14. Wind energy turbine (10,10',10") for generating power to be supplied to a grid (18,18',18"), comprising
 - a rotor (12,12',12"),
 - a generator (14,14',14") operatively connected to the rotor (12,12',12"),
 - a frequency converter (26,26',26") electrically connectable to the generator (14,14',14") and the grid (18,18',18") and comprising a generator-side power converter (32,32',32") operatively connectable to the generator (14,14',14"), a grid-side power converter (28,28',28") operatively connectable to the grid (18,18',18"), and a DC link circuit (30,30',30") for connecting the generator-side power converter (32,32',32") to the grid-side power converter (28,28',28"), and

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- a control unit (38,38',38") for controlling the frequency converter (26,26',26") for generating reactive current to be supplied to the grid,
 - wherein in the event of a substantial grid voltage drop, the control unit (38,38',38") controls the frequency converter (26,26',26") for generating the amount of reactive current to be supplied to the grid (18,18',18").
15. Wind energy turbine according to claim 14, wherein the generator (14) is a double fed asynchronous machine and wherein generating the amount of reactive current to be supplied to the grid (18) is performed by controlling at least one of the generator-side power converter (32) and the grid-side power converter (28).
16. Wind energy turbine according to claim 15, wherein, if the generator (14) is not in its operating state for generating power, the amount of reactive current to be supplied to the grid (18) is generated by controlling the grid-side power converter (28).
17. Wind energy turbine according to claim 14, wherein the generator (14',14") is an asynchronous machine and wherein generating the amount of reactive current to be supplied to the grid (18',18") is performed by controlling the grid-side power converter (28',28").
18. Wind energy turbine according to claim 14, wherein the generator (14',14") is a synchronous machine and wherein generating the amount of reactive current to be supplied to the grid (18',18") is performed by controlling the grid-side power converter (28',28").
19. Wind energy turbine according to claim 17 or 18, wherein, if the generator (14',14") is not in its operating state for generating power, the amount of reactive current to be supplied to the grid (18',18") is generated by controlling the grid-side power converter (28',28").

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20. Wind energy turbine according to any one of claims 14 to 20, wherein for generating reactive current through the frequency converter (26,26',26") the performance factor is controlled.
21. Wind energy turbine for generating power to be supplied to a grid, comprising
 - a rotor (12,12',12"),
 - a generator (14,14',14") operatively connected to the rotor (12,12',12"),
 - a frequency converter (26,26',26") electrically connectable to the generator (14,14',14") and the grid (18,18',18") and comprising a generator-side power converter (32,32',32") operatively connectable to the generator (14,14',14"), a grid-side power converter (28,28',28") operatively connectable to the grid (18,18',18,18"), and a DC link circuit (30,30',30") for connecting the generator-side power converter (32,32',32") to the grid-side power converter (28,28',28"), and
 - a control unit (38,38',38") for controlling the frequency converter (26,26',26") for generating reactive current to be supplied to the grid (18,18',18"),
 - wherein under normal grid condition but with the generator (14,14',14") not in its operating state, the control unit (38,38',38") controlled the grid-side power converter (28,28',28") of the frequency converter (26,26',26") for controlling the amount of reactive current to be supplied to the grid (18,18',18").
22. Wind energy turbine according to claim 21, wherein the generator (14) is a asynchronous machine, a double fed asynchronous machine, or a synchronous machine.
23. Wind energy turbine according to claim 21 or 22, wherein for controlling reactive current through the frequency converter (26,26',26"), the

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performance factor of the grid-side power converter (28,28',28") is controlled.

24. Wind energy turbine according to any one of claims 14 to 23, wherein the control of the frequency converter (26,26',26") is supervised by the utility (44,44',44") or a power management control (42,42',42") of the wind energy turbine (10,10',10") or of a wind park comprising a plurality of wind energy turbines (10,10',10") at least one of which is operatively connected to the grid (18,18',18").